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Some Factors Causing Variations in Crop Production Costs in Putnam County

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SOME FACTORS CAUSING VARIATIONS IN CROP PRODUCTION COSTS IN PUTNAM COUNTY

JOHN F. DOWLER

INTRODUCTION

This study is based on data collected from 23 different farms in the vicinity of Leipsic in Putnam County during the 3 years from 1926 to 1928. The complete cost-route method was used to collect the data from farmers who kept the records. Of the 23 farms in this study, 14 were included for the entire 3-year period, six for 2 years, and three for one year. This group of farms is typical of much of the small grain region of northwestern Ohio.

While many of the factors influencing crop costs, such as weather, are beyond human control, there still remain many other factors that affect yields, costs, and profits in the production of farm crops which are more or less under the control of the operator. It is these factors which the operator may influence by his management that we propose to discuss here, endeavoring to point out how some farmers have succeeded in lowering costs below those of the average.

TYPE OF FARMING

The average size of farm was 140 acres, of which 118 acres were rotated area. Seventeen farm-year records were from farms of less than 100 acres in size, 31 were from farms of 100 to 200 acres, and 10 from farms of 200 to 300 acres.

The soil of these farms is mostly clay loam with some sandy clay loam and silt loam. The under-drainage is not good and the topography is so level that surface drainage is not always effective. While some of the land is well drained with tile, most of the farms need more tile drainage.

The rotation most commonly followed was corn, oats, wheat, and grass. Every farm deviated from this, with rotations ranging from 2 to 5 years, due mostly to the planting of miscellaneous crops or to the failure of wheat or grass. Other crops grown were barley, sugar beets, alfalfa, and soybeans. Of the rotated area 32 per cent was in corn, 36 per cent in small grains, 4 per cent in beets, 2 per cent in soybeans, 7 per cent in alfalfa, and 19 per cent in other hay or rotation pasture. The utilization of farm area is shown in Table 1.

TABLE 1.—Distribution of Crops
Average of 23 farms, 1926-1928

Crop	Average acres per farm	Per cent of total area
Corn	38	27
Oats	17	12
Wheat	13	9
Barley	10	7
Oats and barley mixed	2	2
Soybeans	2	1
Beets	5	4
Alfalfa	8	6
Clover hay	7	5
Mixed hay	1	1
Timothy hay	1	1
Rotated pasture	14	10
Permanent pasture	6	4
Woods	8	5
Yards, lots, lanes, ditches, etc.	8	6
Total farm area	140	100
Rotated farm area	118	85

Crop yields varied considerably from year to year, as shown by Table 2. All the small grains gave good yields in 1926; barley, oats, and corn were poor in 1927; and in 1928 wheat was a failure, while corn yields were exceptionally good.

TABLE 2.—Crop Yields
On all farms, 1926-1928

Crop	Average yield per acre			
	1926-1928	1926	1927	1928
Corn ..... Bu.	48.2	49.5	44.6	50.7
Oats ..... Bu.	50.9	57.2	46.2	49.9
Wheat ..... Bu.	29.6	35.6	23.0	*15.1
Barley ..... Bu.	31.9	45.3	25.0	32.6
Beets ..... Tons	8.5	10.6	8.6	4.2
Alfalfa ..... Tons	1.5	1.6	1.6	1.3
Clover hay ..... Tons	1.7	1.0	1.9	1.4

*Of the wheat acreage sown only 5 per cent was harvested.

Clover, alfalfa, or some grass was pastured or cropped on an average of 26 per cent of the rotated area each year. This does not include the area of clover or grass sown after small grain and plowed under in the fall or the following spring. About one-third of the area in small grain was plowed for the succeeding crop. A few of the farmers had a good stand of sweet clover to plow under, while others seeded little, if any, grass on land which they expected to plow after small grain. Of the rotated land in hay or pasture, 58 per cent of the area was in legumes, 8 per cent in timothy, and 34 per cent in a mixture of clover and timothy.

A large portion of the grain and hay raised was fed to livestock. Of the total corn harvested as grain, only 8.9 per cent was sold; of the wheat raised, 91.2 per cent; of the oats, 44.8 per cent; of the barley, 35.5 per cent; and of the hay harvested 19.1 per cent was sold.

The hog enterprise was the most important livestock enterprise and the sheep the smallest. All farms had each kind of livestock with the exception of sheep. Only nine out of the 23 farms kept sheep at any time during the period of the study. The acres of rotated land and permanent pasture per animal unit varied from 3 acres on the highly stocked farms to 7 acres per animal unit on the lowest stocked farms.

TABLE 3.—Livestock on Farms Studied

Item	Amount of stock per farm		
	Average 23 farms	Maximum	Minimum
Hogs, hundredweight produced	155.8	379.7	31.2
Milk cows, number of head	5.7	22.1	1.9
Other cattle, animal units*	5.1	27.7	.6
Poultry, number of head	149.1	242.6	45.3
Sheep, number of ewes	6.5	22.7	0.0
Horses, number of head	4.4	9.8	2.0

*"Animal unit" is used as a measure of the amount of livestock in terms of one horse, one cow, or a feed-consuming equivalent. One bull, two heifers, or three calves are considered as an animal unit.

Commercial fertilizer was used in varying amounts on different farms. It was the common practice to use fertilizer on beets and wheat; very few of the fields for other small grains received fertilizer. Less than 11 per cent of the corn ground was fertilized. The chief reliance for soil maintenance was placed on livestock and the plowing under of sod and stubble. As an average of all farms, 180 loads of manure were spread on the fields annually. This averaged one and one-half loads per acre of rotated land. If all the manure hauled had been put on land to be plowed for corn it would have made 4.8 loads per acre of corn. The amount of manure hauled per animal unit varied from 3 to 9 loads per year.

SOURCES OF INCOME

The main sources of income were as follows: hogs 36 per cent, cattle 21 per cent, crops 29 per cent, poultry 10 per cent, and sheep 2 per cent, leaving 2 per cent for receipts from other sources. The livestock receipts were chiefly from dairy products, although two farmers bought steers to feed and several others raised a limited

number of their own feeders. Wheat was the main item in crop sales, forming 11 per cent of the total income; sugar beets were second in importance, forming 8 per cent. Sales of other crops were as follows: barley and oats 5 per cent, corn 2 per cent, hay 1 per cent, and other crops 1 per cent of the total income.

LABOR AND POWER USED

Of the 23 farms in this study 15 were primarily one-man farms, although, in addition to the operator, from 1 to 8 months of family and extra hired labor were used. Six of the farms could be classed as two-man farms; these had from 11 to 21 months of labor other than that of the operator. Two farms were more than two-man farms. One had three men and 3 months' extra labor, and the other, four men and about 7 months' extra labor.

The cost of all hired labor, whether by month or day, averaged 25.5 cents per hour. The labor of the operator was valued at 30 cents per hour. Labor rates used in this study are a combination of the cost of hired labor and the value placed on the labor of the operator; as an average of all farms this amounted to 28.7 cents per hour.

Horses were depended upon to furnish most of the power, the average being a little over four horses per farm. During the period of the study 9 out of the 23 farmers owned tractors, and one other had access to a tractor owned by his father.

Horse-work rates varied from 8.3 to 19.2 cents per hour on the various farms. This range is largely due to the variation in the number of hours worked annually per horse. The average cost on all farms was 11.8 cents per hour of horse work.

FACTORS AFFECTING CROP COSTS IN GENERAL

There are numerous factors which may affect crop production costs. In the following pages are presented some of the more important of these factors that are more or less under the control of the operator, showing their relation to the cost of production as found upon the farms included in this study.

Small fields increase labor requirements.—About 23 per cent of the fields or areas of land from which grain or cultivated crops were harvested were less than 6 acres in size. This group of small fields made up 6.4 per cent of the total area in such crops. About 62 per cent of all fields in these crops were below 12 acres in size; many of the smaller areas were not individual fields fenced separately but

were merely portions of larger ones planted in different crops. These small sized fields do not lend themselves to the best use of labor and machinery.

TABLE 4.—Size of Fields: Grain and Cultivated Crops, Numbers and Area by Groups, 57 Farm-Year Records, 1926-1928

Group	Average size of field	Area		Number	
		Total	Per cent	Total	Per cent
	Acres	*Acres*		*No.*	
Less than 6 acres	3.20	318	6.4	99	22.6
6–11 acres	9.17	1587	32.0	173	39.5
12–17 acres	14.67	1496	30.2	102	23.3
18 or more	24.23	1551	31.4	64	14.6
Total	.....	4952	100.0	438	100.0

The cost of producing those crops which were planted on plowed ground was affected by the size and shape of the field in which they grew. The operators in this study plowed an average of 45 acres each spring. When a three-horse sulky plow was used it took 6 days, or 29 per cent, longer to plow this area of land arranged in fields under 6 acres than in fields of 12 acres or more.

TABLE 5.—Effect of Size of Field on Rate of Plowing for Corn

Field group	Average size of field	14-inch, 2 horses		14-inch, 3 horses		2–12-in., tractor	
		Time per acre	Acres per 10-hour day	Time per acre	Acres per 10-hour day	Time per acre	Acres per 10-hour day
	Acres	*Hours*	*Acres*	*Hours*	*Acres*	*Hours*	*Acres*
Less than 6 acres	3.76	6.11	1.6	5.98	1.7	.....	.....
6 to 12 acres	9.47	5.75	1.7	4.97	2.0	1.90	5.3
12 acres or more	21.81	5.62	1.8	4.65	2.2	1.56	6.4

In the cultivation of corn the large fields had an advantage over the small ones. With a one-row, two-horse cultivator it took more than a third of an hour, or 22 per cent, longer to cultivate an acre of corn in a field containing less than 6 acres than in a field of 12 acres or more. In cultivating the average corn area of 38 acres per farm three times, it would take 4 days longer if the area were divided into fields of the small-sized group rather than of the large-sized group.

TABLE 6.—Corn: Effect of Size of Field on the Use of One- and Two-row Cultivators

Field group	Average size of field	1-row, 2-horse		2-row, 3-horse	
		Time per acre	Acres per 10-hour day	Time per acre	Acres per 10-hour day
	Acres	*Hours*	*Acres*	*Hours*	*Acres*
Less than 6 acres	3.55	2.02	4.9	1.22	8.2
6-12 acres	9.43	1.69	5.9	.85	11.7
12 acres or more	20.12	1.65	6.1	.85	11.8

There were other operations which required less labor per acre in large fields than in small ones; for instance, in discing, dragging, and harrowing with 3- and 4-horse teams, less time per acre would be lost in turning at the ends of the larger fields.

When the labor of all operations up to harvest in the production of corn by horse-drawn equipment was considered, there was a saving of 3.7 hours, or 23 per cent, of man labor per acre in fields of over 18 acres as compared with fields containing less than 6 acres. With an average area of 38 acres of corn per farm, this difference would amount to 14 days of man labor. If the saving of man labor and horse work was expressed in monetary values, it would amount to $2.62 per acre, or $99.56 per farm.

TABLE 7.—Effect of Size of Field on Labor Expended in Growing Corn Up to Harvest, on Tractor Farms and Horse Farms, 1926-1928

Item	Fields	Average size	Labor per acre			Cost of labor and power per acre
			Man	Horse	Tractor	
	No.	*Acres*	*Hr.*	*Hr.*	*Hr.*	*Dol.*
Tractor farms, total	58	17.2	9.7	17.6	2.1	7.01
Fields under 12 acres	23	10.0	11.1	17.4	2.6	8.08
Fields 12 acres and over	35	22.0	9.3	17.7	2.0	6.69
Horse farms, total	98	11.3	14.2	35.7	.....	8.33
Fields under 6 acres	22	3.6	16.4	39.9	.....	9.75
Fields 6 to 12 acres	34	9.2	14.9	37.9	.....	9.00
Fields 12 to 18 acres	27	14.0	14.4	36.3	.....	8.54
Fields 18 acres and over	15	22.3	12.7	32.1	.....	7.13

Farmers using tractors for plowing and for other operations did not, as a rule, have small fields, but the few that did have tilled them with horses. On farms owning tractors there was a difference of $1.39 per acre, or 17 per cent, for labor and power in corn production up to harvest in favor of fields of over 12 acres as compared with fields smaller in size, as shown in Table 7.

Large fields lend themselves to a more economical use of labor in conjunction with machinery. Crop costs could be reduced by combining small fields or areas into larger units.

More hours per acre with 2-horse teams.—About 19 per cent of the ground broken for corn and small grains was plowed with 2-horse plows and 45 per cent with 3-horse plows. Forty per cent of the seedbed preparation for corn and small grains and of the cultivation of corn was accomplished with 2-horse teams. When 2-horse teams were used for all operations in the growing of 45 acres of corn up to harvest it was found to take 18 days, or 37 per cent, more labor than when the same area was farmed with 3- and 4-horse teams. Unless man labor was very cheap it was more economical to use the larger teams wherever possible. With three or more horses per team, work was accomplished more quickly and nearer the optimum time. Larger teams were accompanied by larger sized machinery. See Table 23 for a comparison of the work accomplished with various sized implements and teams.

Efficient man labor lowers crop costs.—The quality of work done is not always in proportion to the amount paid per hour or day. The highest priced labor was that hired during the harvesting period, which sometimes cost as much as $5.00 per day. The lowest priced labor was that which was hired by the year, with the work so planned that employment was steady all through the year. One man so hired worked an average of 9.6 hours per day and received $56 per month in cash or other considerations, this wage amounting to 21 cents per hour. In January this hired man worked an average of 8 hours per day; while in August he worked 11 hours.

The cost of producing crops was affected by the variations in the cost per hour of man labor, as well as by the amount of work accomplished in a day. On corn, man-labor costs constituted over 32 per cent of the total production and harvesting costs other than interest on land. With small grains man labor amounted to 22 per cent and with alfalfa hay 33 per cent of the total cost other than interest on land.

Man-labor rates on individual farms varied from 25.3 to 32.0 cents per hour. This difference of 6.7 cents in the range, when applied to the average time spent per acre of crops with an average yield, would amount to 3.5 cents per bushel for corn, 2.8 cents for wheat, 1.3 cents for oats, 2.0 cents for barley, and 44 cents per ton for alfalfa hay. Some of these amounts are small but they often make the difference between a profit and a loss.

The work accomplished in a 10-hour day varied considerably. Some men were able to do more work or cover more acres in a day with the same size teams and implements than others. An average 10-hour day's work for various operations and given sizes of implements is shown in Table 23. As a comparison with this average of

all farmers are listed the averages of that 25 per cent of the farmers who did the various operations in the shortest time per acre. The latter figures varied from 6 per cent more than the average day's work of all farmers in cultivating two rows of corn with three horses to 76 per cent more than the average in spike-tooth harrowing with four horses. For all operations it was about 27 per cent higher than the average of all farmers.

When the farmers were grouped according to labor income the group with the highest labor income accomplished an average day's work in 28 per cent less time than the group with the lowest labor income. The men of the first group were able not only to accomplish their work on various classes of livestock and crops in less time but they also accomplished a total of 37 per cent more productive work per man than the latter group.

Power costs may raise or lower crop costs.—Horse-work rates varied from 8.3 to 19.2 cents per hour. The difference of 10.9 cents, when applied to the average quantities of horse work on the various crops, amounted to 8.8 cents per bushel on corn, 7.6 cents on wheat, 3.1 cents on oats, 4.9 cents on barley, and 90 cents per ton on alfalfa hay. Here is another place where a farm operator may gain by lowering his cost of production.

The number of hours that a horse works determines largely the rate per hour. (See Table 8). The range by farms in the number of hours worked per horse varied from 391 to 1339 hours and averaged 867 hours per year. The cost of keeping a horse also varied with the amount of work accomplished. Feed is the largest item and should vary with the amount of work the animal is required to do. Costs may be reduced by turning the horses into pasture or feeding roughage with little or no grain when they are not working and by increasing the amount of grain fed in a season of steady work.

TABLE 8.—Horse Work: Cost per Hour with Farms Grouped According to Hours of Work per Horse, 23 Farms, 1926-1928

Group	Farm years	Horses per farm	Annually per horse		Cost per hour of work
			Amount of work	Net cost	
	No.	*No.*	*Hr.*	*Dol.*	*Ct.*
1	14	3.4	582	86.49	14.9
2	15	4.3	761	92.79	12.2
3	14	4.4	917	104.41	11.4
4	14	4.6	1138	122.79	10.8
Total	57	4.2			
Average			867	102.59	11.8

Nine of the 23 farms were equipped with tractors, some of which were used mostly for plowing while others did a wide variety of work. One operator used his tractor 83 hours while another totalled 415 hours per year. A tractor does not consume gas and oil when not running, but there are certain fixed costs each year whether it runs or not. Such charges as interest on investment, building charges, taxes, insurance, and to some extent depreciation accumulate regardless of use. Repair, gas, and oil costs are proportionate to the hours of use. The tractor costs varied from $2.74 to 68 cents per hour while the tractor was in use. This difference in rate when applied to the cost of producing corn would amount to 8.3 cents per bushel on those farms using tractors.

In this particular study the tractor was used mostly in seed-bed preparation, and we may use the production of corn as an illustration of the comparative cost of these two kinds of power. The farms using tractors for a portion of their seed-bed preparation decreased the use of horse work by 28 per cent and man labor by 47 per cent by the use of a tractor for 2 hours per acre. (See Table 14). The labor and power costs on farms using horses only were $8.19 per acre of corn, as compared with $7.12, or 13 per cent less, on farms using tractors for a portion of their power. Thus, by the use of the tractor, the combined cost of labor and power on these farms was reduced by $1.07 per acre, or over 2 cents per bushel of corn produced.

TABLE 9.—Corn: Comparison of Average Dates of Planting and Yields on Horse and Tractor Farms by Years, 1926-1928

Group	1926		1927		1928	
	Date	Yield	Date	Yield	Date	Yield
		Bu.		*Bu.*		*Bu.*
Horse farms	May 22	48	May 31	45	May 20	47
Tractor farms	May 21	51	May 29	45	May 14	54

Farmers using tractors for all or a portion of their seed-bed preparations planted their corn from 2 to 6 days earlier than those depending on horses. In 1927 both groups produced the same yield, but in 1928 the tractor group produced 7 bushels more per acre than the other. With the tractor they were able to accomplish their work within, or nearer, the optimum time, and, in so doing, the farmers took care of more acres than those using only horses, without causing a large peak load of man labor and horse work.

Time spent hauling manure affects crop costs.—The time spent at this work varied from .7 to 1.7 hours per load on two different farms having approximately the same average hauling distance. Manure spreaders were used on all farms. As an average 180 loads were hauled each year per farm. This difference of one hour of man labor per load would make 18 days' labor saved by the efficient farmer. The total cost of hauling and spreading manure ranged from $1.12 to 43 cents per load. The largest portion of the manure was hauled on land to be plowed for corn and averaged 2.7 loads per acre of corn. The difference in cost of hauling and spreading this amount of manure would make a difference of 3.9 cents per bushel in the cost of producing corn.

Overhead charges per acre were larger on small farms.—General farm expenses which cannot be allotted directly to any one enterprise are considered in this study as overhead charges. They include such items as use of automobile for general farm business, upkeep and repairs on fences, ditching, mowing weeds along fences and around farmstead, interest and taxes on land in roads, lanes, and farmstead, expenses for miscellaneous equipment and small tools, telephone, and other miscellaneous expenses. These are listed in Table 25 with the average amounts expended per farm. Collectively, these overhead items ranged from an annual charge of $70.84 to $685.42 per farm, with an average of $264.06. The overhead charge was prorated to the livestock and crop enterprises in proportion to the gross value of the product of each enterprise. These expenditures increased the cost of producing corn from one to 6 cents per bushel and wheat from 2 to 12 cents per bushel.

Some of these items of overhead are necessary for the good management of a farm but on some farms they are too large for efficient management. On the five farms with the highest labor income for the operator, the overhead costs amounted to an average of $246 annually per farm; while, as an average of the five farms with the lowest labor income, the overhead was $343 annually per farm. The first group contained an average of 189 acres of crops; whereas the latter group had 93 acres. If the overhead were distributed on the crop-acre basis, the high income group would have a charge of $1.30 per acre and, in contrast, the low income group would bear $3.69 per crop acre.

Higher yields cost less per unit.—The cost per acre of producing farm crops is affected by the yields per acre, due to the fact that high yields require additional labor and other harvesting costs

over and above those of low yields. The cost of production per bushel had a very close relation to the yield per acre—the cost per bushel decreased as the yield per acre increased. Table 10 illustrates this with corn, wheat, oats, and alfalfa hay yields, which are divided into three groups with their respective costs of production per unit. As more and more units of labor and fertilizer are put into the production of a crop the cost per acre is increased, but the yield per acre increases faster up to a certain point, thus causing the cost per bushel to decrease.

TABLE 10.—Crop Yields per Acre Compared with Corresponding Cost of Production per Bushel, 1926-1928

Yield group	Corn		Wheat		Oats		Alfalfa hay	
	Yield	Cost*	Yield	Cost	Yield	Cost	Yield	Cost
	Bu.	*Dol.*	*Bu.*	*Dol.*	*Bu.*	*Dol.*	*Ton*	*Dol.*
High	57	0.38	38	0.58	65	0.28	2.2	7.82
Medium	48	0.47	30	0.79	53	0.33	1.4	9.69
Low	39	0.50	21	0.89	38	0.43	1.0	11.11
Average	48	0.44	31	0.70	51	0.33	1.6	8.95

*Up to harvest time.

In the area covered by this study it was more profitable to raise 1800 bushels of corn on 30 acres than the same amount on 45 acres. Besides producing the corn cheaper per bushel, the 15 additional acres could be planted to some other useful crop, such as alfalfa, soybeans, beets, etc., and additional income thereby gained.

TABLE 11.—Corn: Portion Planted at Various Dates and Resulting Yields per Acre on 23 Farms, by Years, 1926-1928

Date planted	1926		1927		1928	
	Yield	Portion planted	Yield	Portion planted	Yield	Portion planted
	Bu.	*Per cent*	*Bu.*	*Per cent*	*Bu.*	*Per cent*
May 10 or before	44	.5	65	2.7	55	21.6
May 11-20	52	45.2	40	1.6	52	56.5
May 21-30	48	43.8	46	50.0	51	12.9
May 31-June 9	39	10.5	43	41.0	44	1.3
June 10 and later	.....	.....	31	4.7	32	7.7

Planting after average date lowers yield.—Good or poor yields may be due to the length of the growing season and hence to the date of planting. In this section corn gave the highest yield when planted before May 10 in two years out of three. The season was late in 1926 and the best yields were obtained when corn was

planted May 11 to 20. In 1927 between May 13 to 19 there was a week of very unfavorable weather; corn planted before this, or soon afterward, gave the highest yields. In 1928 corn planted before May 10 yielded about 72 per cent more than corn planted after June 10. Each succeeding 10-day period after May 10 produced a lower yield than the preceding period.

The date of planting also affects the yields of small grains, as shown in Table 12. All fields of each grain were divided into two groups of about the same size according to the date of seeding. The data show that the groups seeded earlier raised 25 per cent more wheat, 13 per cent more oats, and 27 per cent more barley to the acre than the groups seeded at a later date.

TABLE 12.—The Effect of Date of Planting Small Grains on Yields per Acre

Crop	Number of fields	Date planted	Yield per acre
			Bu.
Wheat	10	Oct. 15 or before	25
	14	After Oct. 15	20
Oats	35	April 17 or before	53
	34	After April 17	47
Barley	27	April 13 or before	33
	28	After April 13	26

Within a community each crop has an optimum time of planting for the development of good yields; it may not be the same day or days of the month each year but it will vary with the season. A good operator will recognize these conditions and be prepared to plant when, in his judgment, they are most favorable.

Heavy fertilizer applications give good yields.—For a long time it has been known that some fields continually raise better crops than others and that the amount of available plant food varies in different soils. Raising 100 bushels of corn to the acre necessitates the extraction of more plant food from the soil than raising only 50 bushels.

The fields of corn in this study were grouped according to the date of planting; then the fields in each group were divided into two parts according to yield. As the date of planting affects the yield, it is desirable to hold this factor constant if possible, while the effect of manure and fertilizer is considered. In each case, illustrated in Table 13, the fields with the higher yields received the greater amounts of manure and fertilizer concurrently applied. The charging of the manure and fertilizer to the corn crop, as

shown in Table 13, is the result of prorating the whole amount applied in the rotation on the basis of fertility extracted by each crop.

TABLE 13.—Corn Yields: Relation of Amount of Manure and Fertilizer Applied, by Date of Planting

Group	Number of fields	Yield per acre	Manure and fertilizer per acre	
			Applied to corn	Charged to crop
		Bu.	*Dol.*	*Dol.*
1. Planted May 21–30, 1927:				
With yields below 45 bu.	11	38	0.38	4.37
With yields above 45 bu.	13	51	2.97	5.94
2. Planted May 30–June 9, 1927:				
With yields below 42 bu.	12	36	1.53	6.54
With yields above 42 bu.	10	53	4.21	6.06
3. Planted May 11–20, 1928:				
With yields below 50 bu.	13	41	2.59	5.08
With yields above 50 bu.	14	59	2.96	5.61

FACTORS AFFECTING COSTS OF SPECIFIC CROPS

CORN

The cost of growing corn up to harvest varied from 37 to 60 cents per bushel on the several farms. This variation was due to the combining of cost items in varying amounts by the several operators. (See Table 27). Applications of manure varied from nothing on many fields to 10 loads per acre on one field of Farm 5. Fertilizer applications per year varied from nothing on most fields to 237 pounds per acre on a field of Farm 1. Dates of planting varied from May 1 to June 28 for individual fields, both of which happened to be in 1928. Labor and power costs varied from $5.41 per acre on Farm 13 to $10.31 per acre on Farm 17. Farm 8 with the lowest cost per acre did not have the lowest cost per bushel. It would be false economy to try to keep the cost of production down by decreasing the amount of labor, manure, and fertilizer used when the proper application of each would more than pay the difference in cost by increased yields. To produce high yields the farmer must consider all cost factors and use a combination of the best practices all along the line of production.

Tractors aid in lowering corn cost.—On farms where a tractor was used for a large portion of the seedbed preparation, corn was produced 4 cents a bushel cheaper than on farms depending on horses for power, as shown in Table 14. This decreased cost is not due alone to the difference in the cost of tractor power and horse work, but it is influenced by the fact that farms with tractors used

less man labor and horse work, resulting in 13 per cent less labor and power cost than the horse farms. The tractor farms used more manure and fertilizer per acre and secured an average increased yield of 3.2 bushels per acre over that of the horse farms.

The average planting date on farms using tractors was May 21; whereas on the farms using only horses it was 4 days later, or May 25. With tractors, the operators were able to reduce their labor and power expense and at the same time plant their corn earlier than those farms depending upon horse power. It is the combination of these small savings that makes the corn crop more profitable on the better managed farms.

TABLE 14.—Corn: Cost of Growing Up to Harvesting, on 23 Farms, 1926-1928

Item	Cost per acre		
	All farms	Tractor farms	Horse farms
Farm-year records	57	21	36
Total acres in corn	2139	1002	1137
Man labor	11.98 hr. $3.45	9.94 hr. $2.80	13.77 hr. $4.01
Horse work	26.93 hr. 3.17	18.21 hr. 2.16	34.61 hr. 4.07
Tractor power	.99 hr. 1.07	2.01 hr. 2.16	.10 hr. .11
Manure and fertilizer charge	5.51	6.11	4.98
Manure applied	2.7 loads	3.1 loads	2.4 loads
Fertilizer applied	21.2 lb.	33.8 lb.	10.1 lb.
Seed	.18	.17	.18
Equipment charge	1.44	1.45	1.44
Overhead	1.22	.84	1.57
Taxes on land	1.27	1.16	1.37
Interest on land	4.00	3.99	4.00
Total cost	21.31	20.84	21.73
Yield	48.2 bu.	50.0 bu.	46.8 bu.
Cost per bushel	.44	.42	.46

Hogging down corn.—About 11 per cent of the corn grown during the 3 years of this study was hogged down. This method of harvesting required little or no man labor, and farmers found it a convenient method of harvesting a portion of their corn and fattening their hogs at the same time.

Various methods were used in harvesting the corn crop. See Table 26 for the acres and per cent harvested by each method. The various factors affecting the cost of harvesting corn will be discussed under the different methods.

Husking from stalk was the cheapest method.—Nearly 30 per cent of the corn grown was husked off the stalk. This method of harvesting put the corn in the crib at the least cost without giving consideration to the stover left in the field. Farm 3 husked an acre

by this method in 6.4 hours; while on Farm 19 it took 14.5 hours of man labor per acre with practically the same yield, as shown in Table 28. The amount of corn husked and cribbed per 10-hour day by this method varied from 30 to 69 bushels with respective costs of 17.5 and 6.3 cents per bushel. Here is a place where costs could be lowered by hiring more efficient labor. As an average of all farms, it cost $4.98 to husk and crib an acre of corn off the stalk, or 10.7 cents per bushel.

Less than a third of the fields were pastured after the corn was husked. These fields were usually planted to oats or other small grains the following spring.

A corn binder saves labor in cutting.—Of the total corn raised, nearly 60 per cent was cut by some method as a part of the harvesting operation. Out of the 23 farms studied, 15 owned corn binders and 2 others borrowed them from neighbors. Binders were used in harvesting 57 per cent of the corn cut. During the last year of the study, 1928, five farmers tried the sled-type of corn cutter on about 52 acres. By this means two men and one horse cut and shocked an average of 2.6 acres per day as compared with 2.1 acres for two men by hand. Cutting corn with the sled cutter was not as tiresome as by hand.

The remaining portion, or 39 per cent, was cut and shocked by hand. This was the cheapest method when man labor was figured at the average rate for regular labor. When special wages were paid for cutting by hand the cost per acre was more than when cut with the binder and shocked by hand. The farms in this study raised, on the average, 38 acres of corn. If this corn were cut and shocked by hand it would require 13 days more of man labor than if it were cut with a binder and shocked by hand. As 69 per cent of the wheat grown was planted after corn, it was quite important that the corn be cut in a relatively short time so as to get the wheat sown at the most favorable season.

The total cost of cutting an acre of corn with a binder was more than that of cutting by hand when regular farm-wage rates for man labor were used. If the operator must depend upon hired labor to harvest his corn, the most economical method would be by the use of a binder. By using a binder instead of cutting by hand, with hired labor at $3 per day and corn binders costing $180, a farm operator in 9 years would save enough in the use of less labor to pay for his old binder and also to pay the same price for a new one if horse-work costs and extra twine were not considered. When horse work and twine are included in the cost of cutting corn with a binder and wages are paid at the rate of 45 cents per hour

TABLE 15.—Corn: Cost of Cutting and Shocking, by Three Methods, 1926-1928

Method	Per cent of total corn cut	Labor per acre							Cost per acre					
		Cutting		Shocking	Pick up ears		Total		Man labor	Horse work	Twine		Equipment	Total
		Man	Horse	Man	Man	Horse	Man	Horse			Amt.	Cost		
		Hr.	*Hr.*	*Hr.*	*Hr.*	*Hr.*	*Hr.*	*Hr.*	*Dol.*	*Dol.*	*Lb.*	*Dol.*	*Dol.*	*Dol.*
Cutting and shocking by hand	39	9.2	.....	.....	.....	.....	9.2	.....	2.66	.....	.5	.07	.....	2.73
Cutting with sled, shocking by hand	4	7.6	4.6	.....	.....	.....	7.6	4.6	2.23	.50	.5	.08	.09	2.90
Cutting with binder, shocking by hand	57	1.9	3.7	3.0	.9	1.0	5.8	4.7	1.62	.63	2.4	.33	.58	3.16
Weighted average	(100)	5.0	2.3	1.7	.5	.6	7.2	2.9	2.05	.38	1.6	.21	.33	2.97

(or the equivalent of 15 cents per 144-hill shock), the cost of cutting and shocking by hand will be equal to the cost when cut with the binder. If wages are less than this amount it would be cheaper to cut corn by hand.

The husker-shredder has advantages over hand methods.—The largest portion, 57 per cent of corn in the shock, was husked by hand. Most of this was done in the field and the grain and stover hauled to the barn separately. Some was hauled to the barn as shock corn and husked inside during the winter months.

The husker-shredder was used to husk 24 per cent of the corn put in the shock. This method required less than half the man labor necessary to husk the shocked corn by hand and haul the corn and the stover to the barn, which is a considerable saving of man labor. Even when the machinery charge for shredder and power costs was added to make the total cost of husking an acre of corn by this method, it was slightly less than when husked by hand. The total costs by these two methods are so near alike that if labor can be had for 29 cents per hour, other things should be considered when making a choice of which method to use. With the shredder method, the stover would be in the barn and in a much better condition to handle and feed. The refuse from shredded fodder used as feed makes good bedding and is much easier to haul out to the field than the refuse from long stover, thus making a further saving of labor.

TABLE 16.—Corn: Cost of Harvesting from the Shock, by Three Methods, 1926-1928

Method	Yield per acre	Labor per acre		Cost per acre				
		Man	Horse	Man labor	Horse work	Equipment	Shredder*	Total
	Bu.	*Hr.*	*Hr.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*
Hauled to barn, fed unhusked	43.2	6.2	9.1	1.62	1.07	.44	.....	3.13
Husked with shredder	45.6	9.4	10.8	2.73	1.35	.59	2.95	7.62
Husked by hand in field	51.5	19.5	11.8	5.69	1.37	.63	.....	7.69
Weighted average	48.5	14.5	11.0	4.20	1.31	.58	.71	6.80

*Includes shredder charge, fuel, and power.

About 19 per cent of the corn put in the shock was not husked but hauled to the barn as shock corn and fed as such to livestock. Beef cattle and hogs made satisfactory gains on corn fed in this manner. The stover was not completely utilized, but those farms had plenty of other roughage and used this method of feeding as a labor saving practice.

TABLE 17.—Corn and Stover: Cost of Harvesting, 1926-1928

Method	Total labor per acre		Cost per acre					
	Man	Horse	Man labor	Horse work	Twine	Equipment	Shredder, cutter	Total
	Hr.	*Hr.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*
Cut by hand, husked by hand in field*	28.7	11.8	8.35	1.37	.07	.63	.....	10.42
Cut by hand, husked with shredder...	18.6	10.8	5.39	1.35	.07	.59	2.95	10.35
Cut with binder, husked by hand in field.....	25.3	16.5	7.31	2.00	.33	1.21	.....	10.85
Cut with binder, husked with shredder	15.2	15.6	4.35	1.98	.33	1.17	2.95	10.78
Weighted average, above methods....	23.6	14.5	6.85	1.76	.21	.95	.88	10.65
Cut with binder, put in silo	15.1	14.8	4.32	1.84	.33	1.05	1.93	9.47

*Hauling stover from field to barn included in costs.

When the costs of cutting and husking by various methods were combined the results shown in Table 17 were obtained. The cheapest method was that of cutting by hand and husking with the shredder, when rates for regular man labor were charged. This method cost 50 cents less per acre than cutting the corn with a binder and husking by hand. The difference in total cost between the various methods was small. However, there was quite a difference in the amount of labor required. The hand method of cutting and husking corn required 13.5 hours more of man labor per acre than when a binder and shredder were used.

If machinery costs remain the same and if the operator must depend upon hired labor at 32 cents per hour instead of 29 cents, both methods would cost the same. When satisfactory labor can be hired for less than 32 cents, corn may be harvested more economically without binders and shredders. On the other hand, if more than 32 cents must be paid for labor, corn binders and corn shredders will be more economical in harvesting the crop. When deciding which method to adopt consideration should be given to the extra time and labor necessary to harvest corn by hand, the quickness with which the crop can be harvested by machinery together with the accompanying use-of-machinery charge, the ease with which the corn and stover may be stored as well as the feeding qualities, and the use of stover for bedding.

SUGAR BEETS

About one third of the farms in this study produced sugar beets at some time during the period under consideration. Sugar beets compete with corn for labor during the peak season and also

with wheat seeding and corn harvest during the latter part of October. This was one important factor that limited the acreage of sugar beets grown.

Larger amounts of man labor are required to grow and harvest beets, as compared with other crops on these farms. Besides the contract labor hired, the operator supplied about 27 hours per acre for growing and harvesting beets as compared to about 26 hours for corn and 10 to 12 hours per acre for small grains. The harvesting of corn may be prolonged over a longer period than that of beets.

The farmer has a better chance of making a profit in raising beets if a good yield is produced. Plowing under a legume sod helps materially to increase the yield, but fertilizer and manure must also be added if satisfactory results are to be secured, the usual application being heavier than is commonly put on wheat or corn.

TABLE 18.—Beets: Cost of Production, 17 Farm-Year Records, 1926-1928

Item	Annually per acre		
	Low-cost farm	High-cost farm	All farms
Area planted ..... acres..	13.4	10.4	18.2
Man labor, regular ..... hours..	35.9	21.6	26.6
Horse work ..... hours..	69.7	31.7	53.3
Tractor power ..... hours..	1.3	3.7	1.3
Total power and labor cost ..... dollars..	23.65	8.08	13.92
Contract labor* ..... dollars..	22.19	20.17	19.60
Manure and fertilizer ..... dollars..	2.55	2.92	4.17
Seed ..... dollars..	1.35	1.96	1.99
Equipment charge ..... dollars..	7.93	4.52	4.06
Overhead charge ..... dollars..	1.83	.97	1.73
Taxes on land ..... dollars..	1.91	1.03	1.29
Interest on land ..... dollars..	4.08	4.08	4.11
Total cost ..... dollars..	65.49	43.73	50.87
Yield ..... tons..	14.0	3.6	8.5
Cost per ton ..... dollars..	4.68	12.14	5.98

*Measurements of area by the beet refining companies extend to the edge of the beet rows for the purpose of determining contract labor payments. Measurements of area used in this study extend to the center of fences or boundaries of fields. This would make a difference appear in the contract labor charges and yields per acre.

The operator of Farm 8 did not hire any contract labor but, with the aid of his three sons, he blocked and topped his own beets. The sugar beet factory offered to supply contract labor for this hand work at $23 per acre, the area being measured to the edge of the beet rows. The labor for doing the same work on Farm 8 at 30 cents per hour amounted to $12 per acre of beet area.

SMALL GRAINS

Comparative cost of production.—There was only a slight difference in the cost per acre of raising the spring-seeded small grains, as shown in Table 19. The difference was relatively greater when costs per bushel were figured. As the weight per bushel varies among these grains, a better comparison may be secured by computing the cost per hundredweight. Then the cost would be $1.04 for oats, $1.10 for barley, and $1.33 for the mixture of oats and barley as grown. If these grains were valued at market prices prevailing at the time when fed or sold, the farmers realized 24 cents per hundredweight above cost of production on oats, 25 cents per hundredweight on barley, and just broke even with the mixture of barley and oats. Barley contains about 13 per cent more digestible nutrients than oats and makes a better feed for hogs and poultry. The mixture of oats and barley gave a smaller yield than that obtained when each grain was planted separately.

TABLE 19.—Small Grains: Comparative Costs of Production, 1926-1928

Item	Wheat		Oats		Barley		Mixed oats and barley	
	Amt.	*Dol.*	*Amt.*	*Dol.*	*Amt.*	*Dol.*	*Amt.*	*Dol.*
Number of farms	19		21		20		3	
Total acres	693		920		552		127	
Cost factors, per acre:								
Man labor	13.1 hr.	3.76	9.9 hr.	2.87	9.5 hr.	2.72	10.0 hr.	2.81
Horse work	21.4 hr.	2.64	14.6 hr.	1.80	14.4 hr.	1.72	13.1 hr.	1.55
Tractor power	.7 hr.	.69	.2 hr.	.23	.3 hr.	.34	.6 hr.	.59
Equipment charge		1.22		.74		.75		.52
Fertilizer charge		2.99		2.73		2.59		3.60
Seed	1.9 bu.	2.72	2.4 bu.	1.17	1.8 bu.	1.53	1.9 bu.	1.21
Twine	3.0 lb.	.42	3.0 lb.	.40	2.8 lb.	.36	1.9 lb.	.29
Threshing and fuel		1.90		1.83		1.57		1.55
Overhead charge		1.45		.72		.87		.75
Land tax		1.40		1.49		1.44		1.34
Interest on land		4.35		4.32		4.47		4.39
Total cost per acre		23.54		18.30		18.36		18.61
Straw credit	1.4 T.	2.10	.9 T.	1.37	1.0 T.	1.45	.6 T.	.88
Net cost of grain		21.44*		16.93		16.91		17.74
Yield per acre	30.7 bu.		50.9 bu.		31.9 bu.		33.3 bu.	
Cost per bushel		.70		.33		.53		.53

*Average cost per acre for producing wheat in 1926 and 1927. If the expense for seeding in fall of 1927, most of which winter-killed, is added to that of the other 2 years, the net cost per acre of harvested grain would be $25.80.

The cost of producing wheat was higher than the spring-seeded grains because of more man labor, horse work, and higher seed value. The period of this study included two very exceptional

years in reference to wheat production. The crop harvested in 1926 was unusually good, averaging about 36 bushels per acre on this group of farms and costing 64 cents per bushel to produce; that in 1927 was nearer normal, with a yield of 23 bushels per acre and a cost of 85 cents per bushel; while in 1928 only 5 per cent of the wheat seeded the previous fall was harvested, yielding 15 bushels per acre. If the seeding costs of this winter-killed wheat are included in an average cost for the 3 years, an acre of wheat harvested cost $25.80, or 86 cents per bushel instead of 70 cents as given in Table 19.

Plowing for small grains.—Less than one-sixth of the area seeded to small grains was plowed. The portions of the various grains seeded on plowed ground are as follows: wheat 26 per cent, oats 7 per cent, barley 13 per cent, and mixture of oats and barley 3 per cent. Other than wheat, the samples are too small to determine the difference in cost of raising small grain on plowed or unplowed ground. The wheat sample also became too small because of the large portion winter-killed in 1927-1928.

Plowing for small grains was not important because the major portions of them were seeded after corn. About 69 per cent of the wheat and 74 per cent of the spring-seeded grains followed corn. About 13 per cent of the spring-seeded grains followed beets on ground not plowed. Extra labor is necessary when the seedbed is plowed, but this is usually offset by a larger yield if the ground is plowed early enough to be put in good condition before the seeding. Also, the plowed fields can be seeded to wheat at an earlier date than when it is necessary to wait for the cutting of corn.

Threshing small grains.—All of the small grains were threshed from the shock without having to stand in the field a great length of time, owing to the convenience of threshing machines in the vicinity. These machines and crews were of different sizes and made a wide range of accomplishments in a day. In Table 23 is given the average number of bushels of the various grains threshed in a day by two different sized crews, and the bushels threshed by the 25 per cent that accomplished the most per day. This group threshed 28 per cent more grain in a day than the average of all the crews. Threshing labor formed 50 per cent of the total labor in the production of oats and 39 per cent for wheat. If the crew is too small or too large for the size of the separator, the most economical results cannot be obtained. In the case of wheat and barley the smaller-sized crews of eight or nine men threshed more grain per

man than crews averaging 17 men; while in threshing oats the smaller crews of around ten men accomplished no more per man than crews averaging 18 men.

HAY

Comparative costs of five kinds of hay.—Alfalfa and clover constituted 87 per cent of the hay harvested on this group of farms. Table 20 also presents costs on timothy and two kinds of sweet clover. The data, although limited in quantity, indicated that sweet clover hay was produced at a lower cost per ton than any of the others. Sweet clover hay made in the fall after small grains cost slightly less per ton than that made in the early summer, the quality was finer, and the stand or growth was thinner. It could be cured more quickly than the sweet clover hay cut in the early summer because of finer stems, less rain, and drier ground. The cost per ton of sweet clover hay cut in the fall after small grains was less because the yearly tax and interest charge was shared jointly with the small grain harvested; also the cost of seed was divided with the crop of the following year in case the sweet clover was left for pasture. On the other hand, hay cut in the early summer had to bear the total of these charges for that current year.

TABLE 20.—Hay: Comparative Costs of Production, 1926-1928

Item	Alfalfa		Clover		Timothy		Sweet clover			
							Cut in the early summer		Cut in fall after small grain	
	Amt.	*Dol.*	*Amt.*	*Dol.*	*Amt.*	*Dol.*	*Amt.*	*Dol.*	*Amt.*	*Dol.*
Number of farms	19		17		7		7		5	
Total acres	414		350		81		30		51	
Cost factors, per acre:										
Man labor	10.5 hr.	3.01	6.7 hr.	1.90	6.5 hr.	1.88	5.3 hr.	1.56	3.4 hr.	0.97
Horse work	13.3 hr.	1.58	10.3 hr.	1.16	9.7 hr.	1.30	8.7 hr.	1.13	4.9 hr.	.67
Equipment charge		.65		.50		.52		.44		.32
Fertilizer charge		1.84		2.19		3.33		1.11		.57
Seed	7.6 lb.	2.33	9.4 lb.	2.51	3.3 lb.	.33	7.9 lb.	.77	4.1 lb.	.51
Overhead charge		.88		.50		.66		.47		.25
Land tax		1.38		1.38		1.33		1.20		.33
Interest on land		4.35		4.33		4.25		4.15		1.03
Total cost per acre		16.02		14.46		13.60		10.83		4.65
Credit for pasture		1.70		1.58		2.06		3.00		.88
Net cost per acre		14.32		12.88		11.54		7.83		3.77
Yield of hay per acre	1.6 T.		1.4 T.		1.3 T.		1.1 T.		.6 T.	
Cost of hay per ton		8.95		9.22		9.00		7.28		6.39

Alfalfa hay was produced at a lower cost per ton than clover hay. The yield of alfalfa hay was only slightly more than that of clover for several reasons. The alfalfa was raised in the rotation, seeded with small grains, and most of it made into hay or pastured one year, and then plowed under for a succeeding crop. The stands were thinner than where fields were given special preparation, seeded in alfalfa, and left standing several years. Most of the farmers made two cuttings of alfalfa each year. Alfalfa meadows were usually pastured later in the summer and fall.

In a comparison of the costs of producing alfalfa and clover, consideration must be given to the fact that the seed for a stand of clover cost more than for alfalfa during this period. However, more man labor per acre was required for alfalfa than for clover because of the several cuttings. The yields of alfalfa ranged from .7 ton per acre on a field cut once to 3.2 tons on a field cut three times. The yields of clover ranged from .5 ton per acre where pastured before cutting to 2.2 tons per acre for a full crop. The higher yields were produced at a lower cost per ton.

COMPARISON OF COSTS AND RETURNS ON VARIOUS CROPS

The production and harvesting of sugar beets required the greatest expense per acre of any of the crops grown, amounting to almost twice that of corn and wheat, which are the crops nearest to beets in amount of cost. Oats, barley, and alfalfa cost the least per acre. The five farms with the highest labor income produced these crops at lower cost per acre in each case than the five farms with the lowest labor income. The former also had higher yields.

TABLE 21.—Costs and Returns of Various Crops, on Two Groups of Farms and the Average of All Farms, 1926-1928

Crop	5 farms, highest labor income	5 farms, lowest labor income	Average of all 23 farms
	Dol.	*Dol.*	*Dol.*
Average labor income annually per farm	2133.00	378.00	1110.00
Crop cost per acre:			
Corn	26.80	27.59	26.13
Wheat	25.10	26.89	25.80
Oats	17.00	19.03	16.93
Barley	16.59	17.49	16.91
Alfalfa	11.85	16.53	14.32
Beets	51.60	53.04	50.87
Crop returns above cost per acre:			
Corn	11.47	2.88	6.37
Wheat	26.29	11.62	18.47
Oats	6.50	3.13	3.92
Barley	7.55	2.22	3.89
Alfalfa	8.63	8.39	7.06
Beets	9.69	−4.80	8.70

During the years of this study wheat gave the largest returns above cost of production, with beets, alfalfa, and corn following in order. Oats and barley returns were much less than those from other crops. The group of farms with the highest labor income received $14.67 more returns per acre above cost from wheat than the group with the lowest income. The former group also received $14.49 more from beets and $8.59 more returns per acre above cost from corn. This extra return coupled with a greater number of acres materially increased the farm income.

TABLE 22.—Prices Realized for the Various Crops, on 23 Farms, 1926-1928

Crop	Average for 1926–1928	1926	1927	1928
	Dol.	*Dol.*	*Dol.*	*Dol.*
Corn, per bushel	0.70	0.58	0.71	0.79
Wheat, per bushel	1.30	1.35	1.23	1.08
Oats, per bushel	.41	.35	.46	.42
Barley, per bushel	.65	.55	.77	.63
Beets, per ton	7.00	7.00	7.00	7.00
Alfalfa, per ton	13.36	13.93	10.37	15.58

Note: This price was secured by subtracting the beginning inventory from the sum of the values of crops at the time they were fed to livestock, at the time of sale, when used as seed, and at the ending inventory; then dividing the value by the number of bushels or tons.

SUMMARY

Small-sized fields containing less than 6 acres required 29 per cent more man labor in the production of corn than fields containing 18 acres or more.

The group of farms with the highest labor income accomplished an average day's work in 28 per cent less time and also performed 37 per cent more productive work per man than the group with the lowest labor income. The former group was able to accomplish more work in a day through better plans and management than the latter group.

The use of a tractor to the extent of 2 hours an acre saved 47 per cent of man labor and 28 per cent of horse work in the production of corn up to harvest. The total labor and power cost was $1.07 less per acre on farms using tractors; they were able also to plant their corn 4 days earlier than farms using horses for power.

The amount of labor utilized in hauling and spreading a load of manure ranged from .7 to 1.7 hours. This difference of one hour of man labor per load would make 18 days' labor saved by the efficient farmer in hauling out the average amount of manure annually.

The overhead costs of the five farms with the highest labor income for the operator averaged $246 annually per farm, as compared with $343 on the group with the lowest labor income. This latter group of farms had a much smaller business to absorb the additional expense; hence, the production costs of their various products were increased to a greater extent.

High yields cost more per acre but less per unit of product. It was more profitable to raise 1800 bushels of corn on 30 acres than the same amount on 45 acres.

There was an optimum time for the planting of each crop. Those put in before the average planting date gave larger yields than the ones planted later. This increase was 25 per cent for wheat, 13 per cent for oats, 27 per cent for barley, and 22 per cent for corn.

Fertilizing charges were mainly cash costs. But, as this expense was increased or additional amounts of fertilizing materials were applied to the soil, the additional yields of crops were more than enough to pay the extra costs.

Husking corn from the stalk was the cheapest method of harvesting, aside from hogging it down, when the use of stover was not considered. The average cost of husking from the stalk and cribbing was $4.98 per acre with a yield of 48 bushels.

Cutting corn with a binder and husking with a shredder proved the quickest method of harvesting both corn and stover and left them in the best condition to feed. It required 15 man hours per acre for this method, as compared with almost 29 man hours per acre when the corn was cut and husked by hand and hauled to the barn. If machinery costs remain the same and satisfactory labor can be hired for less than 32 cents per hour, corn and stover can be harvested more cheaply by hand methods than by machinery. Other advantages and disadvantages should be considered when deciding which method to use.

Sugar beets cost twice as much to produce as corn. They require more labor and compete directly with corn for time. It required a yield of over 7 tons of sugar beets to cover the cost of producing one acre.

Barley cost 5 per cent more to produce per hundred pounds than oats but contains 13 per cent more digestible nutrients.

Alfalfa hay was produced at a lower cost per ton than clover.

Wheat, beets, alfalfa hay, and corn gave higher returns above costs than other crops.

The group of farms with highest labor income had lower costs of production and greater returns above cost than the group with lowest labor income.

APPENDIX

METHODS USED IN COMPUTING COSTS

Man labor.—The rate for man labor was calculated for each farm yearly. The cost of hired labor was arrived at by taking into account all considerations given to the men, such as use of house and garden, keeping of cow or horse, fuel, meat, milk, fruit, potatoes, board, and other items furnished, as well as wages paid. To this was added the operator's labor at 30 cents per hour. The total of these was divided by the total hours of labor performed by the hired men and operator combined.

Horse work.—A separate rate for horse work was calculated for each farm. The cost of keeping work horses included feed, bedding, pasture, man labor, building charges, equipment charges, interest, depreciation, taxes, insurance, shoeing, veterinary services, and miscellaneous costs. After deducting credit for manure produced, the net cost was divided by the hours of horse work to get a cost rate per hour. This rate was used for all horse work that year.

Equipment charges.—Such items as labor for repairing, cash repairs, fuel, lubricants, use of buildings, depreciation of equipment, interest, taxes, and insurance made up the equipment charges. These were prorated to the various enterprises according to the number of horse hours spent on them.

Tractor costs and tractor equipment charges were prorated on the number of hours each machine was in use.

Manure and fertilizer charges.—Livestock was credited with the manure produced at the rate of one dollar per load. Crops were charged the same amount, plus the cost of hauling and spreading. This total charge for manure and fertilizer was distributed each year to the various crops on the basis of relative quantity of fertilizing materials removed from the soil. The following weights were used in the distribution: 6 units to every ton of corn or small grain; 5 units to every ton of timothy hay; 2 units to every ton of clover, alfalfa, sweet clover, and soybeans; and 1 unit to every ton of silage and sugar beets.

Other cost factors.—Purchased seeds, twine, coal or other fuel, and machine charges for threshing, silo filling, and shredding were charged to the crops at cost. Home-grown seed was valued at market price for a like quality.

Taxes as they appear in this study are only the taxes on the bare land. A portion of the real estate tax was prorated to the buildings. Taxes on equipment and livestock were charged directly to those accounts.

Interest that appears as such in these cost tables represents 4 per cent interest on the estimated value of the land. As an item of cost, it is subject to considerable difference of opinion and so may be included or excluded according to the wishes of the reader. Interest on working capital was taken at 5 per cent and has been included in the respective accounts, such as equipment charge, building charge, and horse-work costs.

Storage charges for grain and hay have not been included in the cost of production and harvesting data.

In the following tables are shown some detailed data relative to material presented in the text.

TABLE 23.—A Day's Work for Various Farm Operations

Operation	Size of implement	Crew		Work accomplished per 10-hour day	
		Men	Horses, or tractor	Average all farms	25 per cent accomplishing the most*
		No.	*No.*	*Acres*	*Acres*
Seed-bed preparations:					
Plowing for corn	Walking plow	1	2 horses	1.7	2.0
Plowing for corn	14-in. sulky	1	3 horses	2.0	2.4
Plowing for corn	2-12-in. gang	1	Tractor	6.1	7.8
Plowing for wheat	Walking plow	1	2 horses	1.6	1.8
Plowing for wheat	14-in. sulky	1	3 horses	2.0	2.4
Plowing for wheat	2-12-in. gang	1	Tractor	5.3	6.2
Discing plowed ground	6-7-foot tandem	1	3 horses	9.8	10.9
Discing plowed ground	6-7-foot tandem	1	4 horses	11.2	12.9
Discing plowed ground	6-7-foot tandem	1	Tractor	17.6	25.4
Discing plowed ground	8-foot tandem	1	Tractor	19.2	.....
Discing unplowed ground	6-7-foot tandem	1	3 horses	10.0	11.2
Discing unplowed ground	6-7-foot tandem	1	4 horses	11.3	12.6
Discing unplowed ground	6-7-foot tandem	1	Tractor	18.1	25.0
Spiketooth harrowing	2 sections	1	2 horses	9.3	10.3
Spiketooth harrowing	2 sections	1	3 horses	11.2	14.2
Spiketooth harrowing	2 sections	1	4 horses	12.9	15.2
Spiketooth harrowing	3 sections	1	3 horses	13.5	17.0
Spiketooth harrowing	3 sections	1	4 horses	13.7	24.2
Spiketooth harrowing	3 sections	1	Tractor	14.7	25.4
Cultipacking	7-8-foot	1	2 horses	12.0	14.3
Cultipacking	7-8-foot	1	3 horses	12.9	15.9
Cultipacking	7-8-foot	1	4 horses	13.6	17.5
Cultipacking	7-8-foot	1	Tractor	18.5	20.0
Rolling	7-foot	1	2 horses	12.5	14.6
Rolling	8-foot	1	2 horses	14.2	16.4
Dragging or planking	8-10-foot	1	2 horses	12.5	14.7
Dragging or planking	8-10-foot	1	3 horses	13.2	16.1
Corn:					
Planting	2-row	1	2 horses	12.4	13.6
Spiketooth harrowing	2 sections	1	2 horses	15.8	17.5
Spiketooth harrowing	2 sections	1	3 horses	16.7	17.9
Spiketooth harrowing	3 sections	1	2 horses	15.6	18.2
Cultipacking	8-foot	1	2 horses	15.1	17.2
Cultivating	1-row	1	2 horses	6.0	7.5
Cultivating	2-row	1	3 horses	11.7	12.4
Cutting and shocking	.....	1	.....	1.1	1.3
Cutting	Binder	1	2 horses	5.0	6.0
Shocking after binder	.....	1	.....	2.8	4.0
Husking from shock	.....	1	.....	41.1 bu.	47.4 bu.
Cribbing	Wagon	1	2 horses	197.0 bu.	252.1 bu.
Husking from stalk	Wagon	1	2 horses	46.9 bu.	62.0 bu.
Husking from stalk	Wagon	2	2 horses	97.8 bu.	136.9 bu.
Hauling corn and filling silo	.....	9	8 horses	41 tons	60 tons
Haul and shred corn and fodder	.....	10	12 horses	484 bu.	755 bu.
Haul shock corn	.....	1	2 horses	1.6	2.1
Oats, wheat, and barley:					
Drilling	64-70-in. drill	1	2 horses	9.4	10.3
Drilling	64-70-in. drill	1	3 horses	10.3	13.6
Drilling	80-84-in. drill	1	2 horses	10.1	14.2
Drilling	80-84-in. drill	1	3 horses	12.6	15.1
Cutting	7-foot binder	1	3 horses	10.7	13.1
Shocking oats—51 bu. yield	.....	1	.....	5.9	7.9
Shocking wheat—31 bu. yield	.....	1	.....	4.8	7.3
Shocking barley—31 bu. yield	.....	1	.....	5.8	8.1
Threshing oats	Wagons	10	16 horses	990 bu.	1259 bu.
Threshing oats	Wagons	18	22 horses	1811 bu.	2288 bu.
Threshing wheat	Wagons	8	14 horses	609 bu.	744 bu.
Threshing wheat	Wagons	17	22 horses	930 bu.	1219 bu.
Threshing barley	Wagons	9	16 horses	824 bu.	975 bu.
Threshing barley	Wagons	17	22 horses	1179 bu.	1632 bu.
Sugar beets:					
Drilling	4-row drill	1	2 horses	12.6	15.9
Cultivating	4-row	1	2 horses	11.8	13.9
Lifting	1-row	1	2 horses	2.5	2.7
Hay:					
Sowing grass seed	Hand seeder	1	.....	32.0	47.9
Cutting	5-foot mower	1	2 horses	9.7	13.0

*Average of that one-fourth of the farmers who accomplished the most per day at the operation in question and not necessarily at all operations.

TABLE 24.—Average Labor Expended to Produce and Harvest Crops and to Care for Livestock, 23 Farms, 1926-1928

Class of livestock	Average labor per head annually	Kind of crop	Average labor per acre
	Hr.		*Hr.*
Cow	135.2	Corn‡	25.9
Bull	59.5	Wheat	12.5
Heifer	22.1	Oats	10.3
Steer	25.7	Barley	9.5
Calf	27.2	Oats and barley	10.0
Veal*	13.8	Beets§	26.6
Sow	31.1	Alfalfa hay	5.1
Hogs†	4.8	Clover hay	6.7
Sheep (per head)	6.2	Timothy hay	6.6
Chicken (per head)	2.2	Sweet clover hay	4.1

*Labor for veals per head until sold.
†Per 200 pounds of increase in weight after weaning.
‡Includes weighted average of all methods of harvesting.
§Does not include contract labor for blocking, hoeing, and topping.

TABLE 25.—Analysis of Overhead Costs, 23 Farms, 1926-1928

Items	Average per farm annually			
	5 farms, high labor income	5 farms, low labor income	All farms	
			Amount	Proportion of total
	Dol.	*Dol.*	*Dol.*	*Pct.*
Auto, for general farm business	30.92	96.59	61.95	23.5
Fencing, upkeep and repairs	54.60	51.98	56.58	21.4
Miscellaneous equip't and small tools	17.94	41.93	25.27	9.6
Ditching	23.85	30.79	22.25	8.4
Mowing weeds along fences and roads	36.69	29.80	20.96	7.9
Interest on land in farmstead, roads, &	24.86	35.86	18.95	7.2
Telephone	17.32	17.89	17.62	6.7
Drives, walks	5.06	8.81	14.11	5.3
Grading farmstead	17.65	3.32	6.75	2.5
General farm labor	6.94	10.10	6.53	2.5
Taxes on land in farmstead, roads, &	7.20	6.29	6.03	2.3
Lights in buildings other than dwelling	1.43	5.30	4.54	1.7
Organization dues, farm papers	1.58	4.50	2.52	1.0
Total	246.04	343.16	264.06	100.0

TABLE 26.—Corn: Acres Harvested by Different Methods, 23 Farms, 1926-1928

Method	1926	1927	1928	3 years	
				Total	Per cent
	Acres	*Acres*	*Acres*	*Acres*	
Hogged down	63	95	71	229	10.7
Husked off stalk	227	180	230	637	29.8
Cut and fed green	.....	2	3	5	.2
Put in silo	32	44	41	117	5.5
Fed in shock	66	117	36	219	10.3
Shredded	99	72	108	279	13.1
Husked from shock by hand	182	225	242	649	30.4
Total	669	735	731	2135	100.0
Of cutting corn:					
By hand	241	138	114	493	23.1
With sled	.....	10	41	51	2.3
With binder	138	312	275	725	34.1
Total	379	460	430	1269	59.5

TABLE 27.—Corn: Variations in Cost of Production Up to Harvest, by Farms, 1926-1928

Farm	Cost per acre														Yield per acre	Cost per bushel
	Man labor		Horse work		Use of tractor		Equipment charge	Manure and fertilizer	Seed		Overhead charge	Taxes on land	Interest on land	Total		
	Amt.	Value	Amt.	Value	Amt.	Value			Amt.	Value						
	Hr.	*Dol.*	*Hr.*	*Dol.*	*Hr.*	*Dol.*	*Dol.*	*Dol.*	*Lb.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Bu.*	*Dol.*
7	10.6	3.23	26.6	3.25	.....	.....	1.14	6.33	8.7	.23	1.89	1.82	4.48	22.37	60.7	.37
13	8.4	2.52	10.4	1.46	2.8	1.43	.89	4.51	7.4	.15	1.52	1.00	4.48	17.96	46.5	.39
16	14.9	4.46	37.0	3.69	.....	.....	1.46	8.44	8.1	.13	.65	.87	3.21	22.93	59.1	.39
2	9.6	3.03	20.9	2.74	1.8	1.82	1.87	5.58	6.7	.14	.76	1.45	4.92	22.31	56.7	.39
1	10.2	2.73	25.3	2.42	.9	1.53	1.42	7.49	8.0	.16	.54	1.31	3.97	21.57	54.7	.39
23	6.3	1.80	10.0	1.56	2.2	4.13	1.87	3.17	6.9	.12	1.63	.59	4.08	18.95	47.9	.40
5	12.5	3.38	23.0	2.78	1.9	1.94	1.29	4.81	8.2	.19	.87	1.16	4.10	20.52	51.5	.40
8	11.1	3.32	24.5	2.81	.2	.34	.67	2.74	7.5	.16	1.49	1.10	3.12	15.75	40.0	.40
4	13.2	3.73	31.8	3.63	.....	.....	2.09	4.22	7.2	.17	1.78	1.78	5.04	22.44	55.0	.41
9	11.0	3.08	31.0	3.55	.....	.....	.91	5.41	9.2	.20	1.35	1.73	4.47	20.70	50.1	.41
3	14.0	3.78	36.0	3.42	.1	.15	1.09	5.51	8.3	.17	1.01	1.31	4.82	21.26	50.1	.42
10	11.2	3.37	27.7	4.31	.....	.....	1.19	3.61	7.3	.17	2.01	1.27	3.96	19.89	44.7	.45
17	10.8	3.19	18.4	3.44	2.9	3.68	2.22	1.73	9.7	.17	.49	1.91	4.08	20.91	46.6	.45
20	17.8	5.30	42.4	4.30	.....	.....	1.47	2.67	10.5	.19	1.17	1.00	4.06	20.16	43.9	.46
16	8.9	2.25	12.8	1.06	3.1	2.12	.97	6.85	7.8	.21	.91	1.00	3.98	19.35	41.7	.46
14	15.0	4.50	40.8	7.18	.....	.....	1.12	2.73	7.8	.21	1.65	1.85	4.48	23.72	51.0	.47
18	11.1	3.33	25.7	4.17	.5	.32	1.69	5.21	8.2	.17	.54	1.67	4.52	21.62	46.0	.47
22	11.6	3.49	10.8	1.61	4.6	4.89	2.18	2.93	11.5	.21	1.00	1.20	4.08	21.59	45.3	.48
21	17.2	5.14	40.7	4.69	.....	.....	1.70	4.58	8.5	.19	2.34	1.48	3.33	23.45	47.1	.50
15	10.7	3.13	19.0	2.88	1.5	2.54	2.18	7.46	8.9	.16	1.04	1.26	4.04	24.69	48.4	.51
6	8.4	2.38	11.9	1.49	2.1	2.04	1.19	8.78	8.1	.17	.67	.95	3.03	20.70	40.4	.51
12	13.8	4.14	36.9	3.99	.....	.....	1.32	5.37	9.1	.20	1.38	1.32	3.20	20.92	40.6	.51
19	17.2	4.81	46.0	5.39	.....	.....	2.82	5.60	8.7	.21	2.84	1.49	4.10	27.26	47.3	.58
11	13.6	3.99	35.3	3.56	.3	.31	1.56	9.96	.....	.19	1.69	1.03	3.91	26.20	43.4	.60
Tractor farms	9.9	2.80	18.2	2.16	2.0	2.16	1.45	6.11	8.1	.17	.84	1.16	3.99	20.84	50.0	.42
Horse farms	13.8	4.01	34.6	4.07	.1	.11	1.44	4.98	8.4	.18	1.57	1.37	4.00	21.73	46.8	.46
All farms	12.0	3.45	26.9	3.17	1.0	1.07	1.44	5.51	8.2	.18	1.22	1.27	4.00	21.31	48.2	.44

TABLE 28.—Corn: Variations in Cost of Husking and Cribbing from the Stalk, by Farms, 1926-1928

Farm number	Labor per acre		Corn husked and cribbed per hour	Cost per acre			Yield per acre	Cost per bushel
	Man	Horse		Total labor	Equipment	Total cost		
	Hr.	*Hr.*	*Bu.*	*Dol.*	*Dol.*	*Dol.*	*Bu.*	*Dol.*
5	7.57	8.04	6.9	2.96	.35	3.31	52.5	.06
17	7.53	3.21	6.3	2.83	.26	3.09	47.7	.07
3	6.43	9.05	6.8	2.89	.26	3.15	43.7	.07
1	11.52	13.66	4.8	4.31	.61	4.92	55.7	.09
10	6.12	9.90	6.6	3.37	.43	3.80	40.4	.09
7	9.58	19.17	6.3	5.26	.82	6.08	60.3	.10
8	8.35	8.56	4.3	3.47	.23	3.70	35.5	.10
16	11.01	15.15	4.1	4.28	.63	4.91	45.5	.11
14	9.83	13.52	5.2	5.26	.36	5.62	51.0	.11
23	8.14	11.41	6.1	4.19	1.32	5.51	49.4	.11
2	8.73	16.66	6.2	5.26	.96	6.22	54.2	.12
13	4.43	8.87	5.9	2.72	.44	3.16	26.3	.12
11	12.21	4.79	3.7	4.79	.68	5.47	44.7	.12
4	12.34	17.56	4.2	5.49	1.14	6.63	51.8	.13
20	12.38	13.57	3.5	5.07	.48	5.55	42.9	.13
22	13.58	13.91	3.6	6.18	1.29	7.47	48.9	.15
9	12.21	24.41	4.1	7.01	.76	7.77	50.3	.15
19	14.58	21.37	3.0	6.28	1.24	7.52	43.1	.18
12	11.44	20.09	3.1	5.62	.67	6.29	35.6	.18
Average	9.74	12.56	4.8	4.36	.62	4.98	46.6	.11

TABLE 29.—Corn: Variations in Cost of Cutting and Shocking by Hand, by Farms, 1926-1928

Farm	Cost per acre				
	Man labor		Twine		Total
	Amount	Cost	Amount	Cost	
No.	*Hr.*	*Dol.*	*Lb.*	*Dol.*	*Dol.*
5	7.8	2.14	.5	.05	2.19
10	7.2	2.16	.5	.06	2.22
11	7.4	2.18	.7	.10	2.28
13	7.9	2.23	.6	.08	2.31
23	7.9	2.31	.5	.07	2.38
12	7.9	2.36	.5	.06	2.42
3	8.7	2.47	.4	.06	2.53
6	10.0	2.55	.4	.05	2.60
21	9.2	2.76	.7	.10	2.86
17	9.6	2.84	.4	.06	2.90
1	10.5	2.83	.6	.08	2.91
4	10.3	2.89	.7	.10	2.99
19	10.7	2.98	.5	.07	3.05
14	10.0	3.00	.5	.06	3.06
8	10.2	3.05	.5	.06	3.11
16	10.9	3.14	.4	.06	3.20
9	10.4	3.12	.5	.08	3.20
15	11.1	3.24	.4	.05	3.29
7	10.6	3.22	.5	.07	3.29
18	12.8	3.84	.6	.08	3.92
2	15.5	4.87	.5	.06	4.93
Average	9.2	2.66	.5	.07	2.73

TABLE 30.—Corn: Variations in Cost of Cutting with Binder and Shocking by Hand, by Farms, 1926-1928

Farm	Amounts per acre						Cost per acre				
	Labor					Twine	Man labor	Horse work	Equipment	Twine	Total
	Cutting		Shocking	Pick up ears							
	Man	Horse	Man	Man	Horse						
	Hr.	*Hr.*	*Hr.*	*Hr.*	*Hr.*	*Lb.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*
11	1.0	2.8	2.5	1.2	1.5	1.9	1.37	0.39	0.50	0.25	2.51
16	2.3	4.7	4.5	.7	.6	2.2	1.52	.47	.33	.29	2.61
5	1.6	3.1	2.3	1.1	1.5	3.0	1.28	.49	.47	.40	2.64
18	1.6	3.1	3.5	1.0	1.1	1.8	1.46	.65	.33	.29	2.73
3	1.9	3.8	3.3	.8	1.0	2.4	1.48	.47	.46	.34	2.75
6	1.8	3.5	3.9	1.4	1.2	2.1	1.34	.60	.53	.28	2.75
13	1.3	(1.3)*	3.3	.....	.....	4.5	1.35	.59*	.33	.60	2.87
12	2.3	4.7	3.3	.7	1.0	1.8	1.37	.55	.76	.24	2.92
1	1.8	3.5	4.4	.6	.8	2.4	1.75	.40	.68	.32	3.15
2	2.0	3.9	3.5	.5	.6	3.0	1.85	.58	.49	.41	3.33
10	1.9	3.9	3.0	.3	.6	2.8	1.55	.66	.83	.41	3.45
20	2.5	5.0	2.5	.....	.....	3.0	1.50	.50	1.27	.44	3.71
9	2.3	4.6	2.7	1.8	3.2	2.7	1.96	.91	.93	.37	4.17
15	2.0	4.0	2.3	.....	.....	2.3	1.25	.61	2.08	.32	4.26
14	2.1	4.2	5.5	1.0	2.0	1.8	2.49	1.06	.50	.23	4.28
22	2.4	1.9†	2.7	.9	.9	2.6	1.81	1.89†	.65	.34	4.69
19	2.1	5.0	4.3	2.7	2.7	2.5	2.58	.92	.94	.34	4.79
Average	1.9	3.7	3.0	.9	1.0	2.4	1.62	.63	.58	.33	3.16

*Tractor hours.
†In addition to horse work, 1.2 tractor hours.

TABLE 31.—Oats: Variations in Cost of Production, by Farms, 1926-1928

Farm	Cost per acre																Yield per acre	Cost per bushel
	Man labor		Horse work		Use of tractor		Equipment charge	Manure, fertilizer	Seed		Twine, fuel, threshing	Overhead charge	Taxes on land	Interest on land	Total	Straw credit	Net cost	
	Amt.	Value	Amt.	Value	Amt.	Value			Amt.	Value								
	Hr.	*Dol.*	*Hr.*	*Dol.*	*Hr.*	*Dol.*	*Dol.*	*Dol.*	*Bu.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Bu.*	*Dol.*
5....	9.3	2.54	12.7	1.61	.1	.11	.60	2.95	3.1	1.47	2.36	.54	1.36	4.07	17.61	1.69	15.92	64.3	.25
22....	10.9	3.30	12.8	1.90	.8	1.23	.86	1.94	1.9	.76	2.60	.95	1.19	4.08	18.81	1.11	17.70	65.3	.27
23....	10.6	3.01	13.8	2.29	.3	.92	1.79	1.80	2.1	.83	2.52	.74	1.91	4.08	19.89	1.34	18.55	67.3	.28
8....	9.4	2.83	12.8	1.48	.....	.....	.36	1.56	2.3	1.11	2.12	1.00	1.46	4.08	16.00	1.31	14.69	51.2	.29
16....	9.1	2.41	13.9	1.23	.8	.58	.69	1.55	2.5	1.36	2.12	.49	1.02	3.98	15.43	1.28	14.15	47.8	.30
2....	9.7	3.05	11.3	1.49	.7	.70	.95	2.61	2.2	1.13	2.40	.42	1.46	4.92	19.13	1.72	17.41	56.3	.31
1....	10.4	2.75	12.7	1.20	.3	.56	.62	3.91	2.2	1.13	2.81	.33	1.36	4.16	18.83	1.63	17.20	55.8	.31
4....	11.2	3.16	15.4	1.77	.....	.....	1.02	2.13	2.7	1.10	2.37	1.17	1.83	4.92	19.47	1.45	18.02	57.0	.32
14....	8.4	2.50	14.4	2.26	.....	.....	.32	1.50	2.1	1.06	2.29	1.30	2.25	4.48	17.96	1.08	16.88	52.5	.32
15....	13.7	4.00	19.2	2.91	.....	.....	1.75	4.96	2.7	1.10	3.57	.92	1.26	4.04	24.51	1.71	22.80	68.5	.33
3....	10.2	2.70	19.2	2.12	.....	.....	.59	2.78	2.1	1.06	2.42	.68	1.45	5.06	18.86	1.50	17.36	52.4	.33
10....	8.3	2.50	13.4	2.09	.....	.....	.58	1.92	2.0	1.03	2.07	1.31	1.47	4.56	17.53	1.37	16.16	48.0	.34
20....	9.3	2.77	15.6	1.58	.....	.....	.55	1.16	2.3	.92	1.99	.72	1.16	4.07	14.92	.97	13.95	41.0	.34
17....	10.9	3.23	19.4	3.63	.....	.....	1.58	.87	2.0	.82	1.97	.33	1.91	4.08	18.42	1.42	17.00	49.9	.34
12....	9.3	2.81	16.1	1.73	.....	.....	.60	1.88	2.2	1.07	1.91	.79	1.71	4.12	16.62	1.31	15.31	39.9	.38
7....	7.8	2.38	13.6	1.67	.....	.....	.59	2.00	2.2	1.33	1.86	.63	1.81	4.48	16.75	1.11	15.64	40.6	.39
11....	10.0	2.95	18.6	1.86	.1	.11	.83	4.44	1.9	.86	1.71	.78	1.03	3.93	18.50	.98	17.52	43.6	.40
6....	12.2	3.50	13.2	1.63	.3	.34	.70	4.02	3.4	1.52	2.28	.74	.96	4.15	19.85	1.23	18.62	44.9	.41
9....	12.4	3.70	26.1	3.38	.....	.....	1.01	1.66	2.3	1.13	1.93	.47	1.71	4.48	19.47	1.26	18.21	41.2	.44
19....	13.0	3.68	20.0	2.33	.....	.....	1.36	9.51	2.5	1.87	2.60	2.03	1.58	4.12	29.08	1.54	27.54	56.1	.49
18....	7.8	2.35	12.6	2.00	.....	.....	.88	2.50	2.2	1.29	1.62	.38	1.77	4.52	17.31	1.01	16.30	31.0	.53
Av...	9.9	2.87	14.6	1.80	.2	.23	.74	2.73	2.4	1.17	2.23	.72	1.49	4.32	18.30	1.37	16.93	50.9	.33

TABLE 32.—Barley: Variations in Cost of Production, by Farms, 1926-1928

Farm	Cost per acre																	Yield per acre	Cost per bu.
	Man labor		Horse work		Use of tractor		Equipment charge	Manure and fertilizer	Seed		Twine, fuel, threshing	Overhead charge	Taxes on land	Interest on land	Total	Straw credit	Net cost		
	Amt.	Value	Amt.	Cost	Amt.	Cost			Amt.	Value									
	Hr.	*Dol.*	*Hr.*	*Dol.*	*Hr.*	*Dol.*	*Dol.*	*Dol.*	*Bu.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Bu.*	*Dol.*
1.....	8.7	2.30	12.5	1.18	.3	.63	.61	3.86	2.1	1.74	2.31	.38	1.35	4.16	18.52	1.85	16.67	37.3	.45
20.....	9.8	2.94	16.5	1.66	.....	.....	.55	1.28	1.1	.73	1.82	.87	.91	4.07	14.83	1.36	13.47	29.5	.46
13.....	9.2	2.76	11.2	1.46	.8	.30	.68	1.03	1.9	1.56	1.69	1.04	1.05	4.48	16.05	1.42	14.63	31.7	.46
5.....	11.0	2.99	13.5	1.63	.2	.23	.65	2.62	2.2	1.79	2.02	.57	1.25	4.18	17.93	1.68	16.25	34.9	.47
3.....	8.1	2.14	13.6	1.47	.....	.....	.41	2.86	1.5	1.29	2.03	.75	1.36	5.89	18.20	1.55	16.65	34.5	.48
2.....	10.9	2.86	11.4	1.52	.3	.32	.81	1.93	1.9	1.76	1.88	.45	1.49	4.92	17.94	1.59	16.35	33.2	.49
10.....	6.4	2.43	7.9	1.55	.....	.....	.33	1.26	1.9	1.86	1.84	1.08	1.55	4.56	15.66	1.40	14.26	28.4	.50
23.....	8.6	2.47	10.8	1.68	.8	1.81	1.48	1.63	1.6	1.04	2.31	1.33	1.73	4.08	19.56	1.57	17.99	35.2	.51
8.....	11.5	3.46	16.6	1.88	.....	.....	.46	1.54	1.8	1.38	1.88	1.15	1.46	4.08	17.29	1.58	15.71	30.8	.51
9.....	11.0	3.32	15.5	2.12	.....	.....	.48	2.53	1.9	1.92	2.19	.93	1.78	4.48	19.75	1.44	18.31	34.4	.53
16.....	7.6	2.05	12.6	1.19	.5	.41	.60	3.01	1.7	1.51	1.66	.54	1.04	3.99	16.00	1.08	14.92	26.3	.57
18.....	6.9	2.08	9.7	1.51	.3	.26	.81	2.65	1.9	1.96	1.56	.43	2.02	4.52	17.80	.90	16.90	29.6	.57
4.....	12.3	3.46	18.2	2.07	.....	.....	1.18	1.93	1.9	1.25	2.06	1.15	1.76	4.92	19.78	.92	18.86	32.3	.58
22.....	7.7	2.32	7.2	1.07	2.0	.52	1.03	1.04	2.0	1.32	1.38	.59	1.39	4.08	14.74	.99	13.75	22.8	.60
11.....	8.5	2.43	16.3	1.55	.....	.....	.78	4.24	1.5	1.81	1.62	1.63	1.18	4.01	19.25	1.34	17.91	28.7	.62
14.....	16.4	4.92	28.6	5.39	.....	.....	.87	1.20	1.7	1.68	2.27	1.21	1.81	4.48	23.83	1.38	22.45	35.9	.63
7.....	13.4	4.09	29.4	3.59	.....	.....	1.26	2.46	2.0	1.96	2.15	.89	1.82	4.48	22.70	1.47	21.23	33.3	.64
12.....	9.9	2.97	18.1	1.96	.....	.....	.61	2.54	1.6	1.49	1.59	1.11	1.69	4.80	18.76	1.28	17.48	25.3	.69
21.....	14.5	4.34	26.5	2.81	.....	.....	.95	5.74	1.8	1.33	2.23	1.85	1.86	4.88	25.99	1.42	24.57	34.9	.70
19.....	11.1	3.05	19.8	2.14	.....	.....	1.19	6.04	2.3	2.18	1.96	1.93	1.48	4.11	24.08	1.29	22.79	31.4	.73
Av...	9.5	2.73	14.4	1.72	.3	.34	.75	2.59	1.8	1.53	1.93	.87	1.44	4.47	18.36	1.45	16.91	31.9	.53

TABLE 33.—Alfalfa Hay: Variation in Cost of Production, by Farms, 1926-1928

Farm	Cost per acre													Yield per acre	Cost per ton
	Man labor		Horse work		Equipment charge	Manure and fertilizer	Seed	Overhead charge	Taxes on land	Interest on land	Total	Pasture credit	Net cost		
	Amt.	Value	Amt.	Value											
	Hr.	*Dol.*	*Hr.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Tons*	*Dol.*
1	8.0	2.11	14.5	1.36	.64	1.88	2.02	.29	1.34	4.16	13.80	4.54	9.26	1.6	5.99
3	8.5	2.31	16.1	1.90	.49	2.17	2.49	.48	1.22	4.20	15.26	1.18	14.08	2.1	6.83
22	10.5	3.17	13.5	1.99	1.16	.95	1.70	1.14	1.16	4.08	15.35	0	15.35	1.9	8.05
12	10.0	2.99	13.0	1.41	.41	2.04	1.25	1.20	1.67	4.12	15.09	1.81	13.28	1.6	8.30
5	12.7	3.43	12.4	1.41	.54	1.15	1.85	.43	1.17	4.18	14.16	2.26	11.90	1.4	8.48
6	9.5	2.72	11.6	1.41	.55	3.18	3.43	1.15	1.00	4.24	17.68	1.63	16.05	1.9	8.68
18	24.6	7.37	22.7	3.88	1.17	3.37	3.79	.67	1.44	4.52	26.20	.19	26.01	2.9	8.93
4	13.7	3.87	12.0	1.38	.79	1.24	2.32	1.52	1.89	4.92	17.93	2.26	15.67	1.7	9.11
14	8.0	2.38	12.7	2.20	.33	.78	2.66	.81	1.62	4.48	15.26	1.85	13.41	1.5	9.23
11	9.3	2.73	14.5	1.28	.54	6.61	2.37	.35	.98	3.94	18.80	1.26	17.54	1.9	9.25
21	15.2	4.54	19.2	2.04	.67	2.25	2.32	2.14	1.76	4.64	20.36	1.18	19.18	2.1	9.36
8	12.3	3.68	11.1	1.40	.31	.97	2.04	.79	1.39	4.08	14.66	0	14.66	1.5	9.61
16	7.0	1.90	12.6	1.16	.51	1.89	1.01	.42	1.06	4.04	11.99	.38	11.61	1.2	9.73
23	6.8	1.92	9.2	1.54	1.09	.66	2.37	.51	1.21	4.08	13.38	1.71	11.67	1.2	9.91
20	4.4	1.30	4.8	.50	.20	.44	2.90	.55	1.42	4.04	11.35	0	11.35	1.0	11.35
19	17.8	4.95	19.8	2.28	1.21	3.35	1.83	1.63	1.41	4.10	20.76	1.36	19.40	1.6	12.51
10	8.3	2.48	8.5	1.31	.37	.81	1.94	.73	1.45	4.55	13.64	.90	12.74	1.0	12.80
2	6.7	2.11	10.2	1.37	.66	.98	2.55	.26	1.47	4.92	14.32	.74	13.58	1.1	12.84
9	9.2	2.76	17.5	2.17	.78	.93	5.49	.41	1.70	5.79	20.03	.53	19.50	1.3	14.64
Average	10.5	3.01	13.3	1.58	.65	1.84	2.33	.88	1.38	4.35	16.02	1.70	14.32	1.6	8.95

TABLE 34.—Clover Hay: Variations in Cost of Production, by Farms, 1926-1928

Farm	Cost per acre													Yield per acre	Cost per ton
	Man labor		Horse work		Equipment charge	Manure and fertilizer	Seed		Overhead charge	Taxes on land	Interest on land	Total	Pasture credit	Net cost	
	Amt.	Value	Amt.	Value			Amt.	Value							
	Hr.	*Dol.*	*Hr.*	*Dol.*	*Dol.*	*Dol.*	*Lb.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Tons*	*Dol.*
3	4.6	1.19	9.0	.94	.28	2.96	8.0	1.44	.53	1.33	4.48	13.15	3.10	10.05	1.7	5.94
13	4.1	1.24	7.4	1.14	.37	.67	11.1	1.78	.43	1.00	4.48	11.11	5.10	6.01	1.0	6.01
5	4.4	1.18	7.2	.83	.48	2.39	8.7	2.52	.42	1.27	4.14	13.24	.16	13.08	2.1	6.35
9	7.1	1.97	10.9	1.30	.29	1.69	8.7	1.89	.61	1.69	4.30	13.74	1.59	12.15	1.5	7.97
12	9.9	2.96	16.1	1.75	.51	2.08	9.7	1.76	.70	1.83	4.12	15.72	2.62	13.10	1.6	8.08
21	9.2	2.75	15.5	1.98	.75	6.55	7.4	1.86	1.49	1.73	4.88	22.00	3.50	18.50	2.2	8.27
20	5.6	1.68	11.2	1.11	.35	.75	9.4	2.44	.29	.73	4.08	11.44	2.43	9.01	1.1	8.39
22	5.1	1.52	5.6	.86	.56	.66	11.4	2.74	.19	1.23	4.08	11.84	3.84	8.00	.9	8.64
10	7.3	2.18	10.7	1.64	.45	1.52	9.5	3.02	.70	1.38	4.56	15.45	1.62	13.83	1.5	9.33
2	6.0	1.87	8.8	1.13	.62	1.18	9.0	2.66	.15	1.42	4.92	13.96	1.31	12.65	1.2	10.94
19	12.5	3.44	13.5	1.44	.78	4.00	7.2	2.64	1.29	1.47	4.11	19.17	.71	18.46	1.7	11.18
1	6.5	1.72	11.3	1.10	.53	1.90	10.8	3.01	.15	1.26	4.16	13.83	.65	13.18	1.2	11.19
7	4.1	1.24	6.0	.73	.25	1.22	11.1	3.61	.53	1.81	4.48	13.87	.30	13.57	1.2	11.40
16	4.6	1.38	9.2	.92	.37	1.99	9.6	2.09	.21	1.10	4.08	12.14	0	12.14	.9	14.33
4	4.4	1.21	6.9	.72	.37	.53	11.9	3.05	.17	1.47	4.92	12.44	4.66	7.78	.5	14.77
11	4.8	1.42	9.6	.85	.35	3.24	10.9	2.99	.15	.91	3.94	13.85	0	13.85	.9	14.89
14	2.8	.83	5.2	.79	.10	.50	11.1	3.16	.34	1.51	4.48	11.71	0	11.71	.7	16.18
Average	6.7	1.90	10.3	1.16	.50	2.18	9.4	2.51	.50	1.38	4.33	14.46	1.58	12.88	1.4	9.22

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